

# NPN/PNP SILICON COMPLEMENTARY SMALL SIGNAL DUAL TRANSISTOR

Qualified per MIL-PRF-19500/421

## Devices

2N3838

2N4854  
2N4854U

## Qualified Level

JAN  
JANTX  
JANTXV

## MAXIMUM RATINGS

| Ratings                                                                                     | Sym              | 2N3838 <sup>(2)</sup> | 2N4854, U    | Unit                |
|---------------------------------------------------------------------------------------------|------------------|-----------------------|--------------|---------------------|
| Collector-Emitter Voltage                                                                   | V <sub>CEO</sub> | 40                    | 40           | Vdc                 |
| Collector-Base Voltage                                                                      | V <sub>CBO</sub> | 60                    | 60           | Vdc                 |
| Emitter-Base Voltage                                                                        | V <sub>EBO</sub> | 5.0                   | 5.0          | Vdc                 |
| Collector Current                                                                           | I <sub>C</sub>   | 600                   | 600          | mAdc                |
|                                                                                             |                  | One Trans             | Total Device |                     |
| Total Power Dissipation @ T <sub>A</sub> = +25°C<br>@ T <sub>C</sub> = +25°C <sup>(1)</sup> | P <sub>T</sub>   | 0.25 <sup>(2)</sup>   | 0.35         | 0.30 <sup>(3)</sup> |
|                                                                                             |                  | 0.7 <sup>(4)</sup>    | 1.4          | 1.0 <sup>(5)</sup>  |
| Operating & Storage Junction Temp. Range                                                    | T <sub>J</sub>   | 200                   |              | °C                  |
| Operating & Storage Junction Temp. Range                                                    | T <sub>stg</sub> | -55 to +200           |              | °C                  |
| Lead to Case Voltage                                                                        |                  | ±120                  |              | Vdc                 |

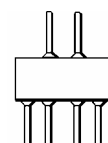
- 1) T<sub>C</sub> rating do not apply to Surface Mount devices (2N4854U)
- 2) For T<sub>A</sub> > +25°C Derate linearly 1.43 mW/°C (one transistor) 2.00 mW/°C (both transistors)
- 3) For T<sub>A</sub> > +25°C Derate linearly 1.71 mW/°C (one transistor) 3.43 mW/°C (both transistors)
- 4) For T<sub>C</sub> > +25°C Derate linearly 4.0 mW/°C (one transistor) 8.0 mW/°C (both transistors)
- 5) For T<sub>C</sub> > +25°C Derate linearly 5.71 mW/°C (one transistor) 11.43 mW/°C (both transistors)



TO-78\*  
2N4854



6 Pin Surface Mount\*  
2N4854U



6 Lead Flatpack\*  
2N3838

\*See MILPRF19500/421  
for package dimensions.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

## OFF CHARACTERISTICS

|                                                                                       |                      |    |          |              |
|---------------------------------------------------------------------------------------|----------------------|----|----------|--------------|
| Collector-Emitter Breakdown Current<br>I <sub>C</sub> = 10 mAdc                       | V <sub>(BR)CEO</sub> | 40 |          | Dc           |
| Collector-Base Cutoff Current<br>V <sub>CB</sub> = 60 Vdc                             | I <sub>CBO(1)</sub>  |    | 10       | μAdc         |
| Collector-Base Cutoff Current<br>V <sub>CB</sub> = 50 Vdc                             | I <sub>CBO(2)</sub>  |    | 50<br>10 | ηAdc         |
| Emitter-Base Cutoff Current<br>V <sub>EB</sub> = 5.0 Vdc<br>V <sub>EB</sub> = 3.0 Vdc | I <sub>EBO</sub>     |    | 10<br>10 | μAdc<br>ηAdc |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

**ON CHARACTERISTICS**

|                                                                                                                                                                                                                                                                                                                                                                      |               |                                   |      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 150 \text{ mAdc}, V_{CE} = 1 \text{ Vdc}$<br>$I_C = 100 \text{ } \mu\text{Adc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$<br>$I_C = 300 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ | $h_{FE}$      | 50<br>35<br>50<br>75<br>100<br>35 | 300  |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$                                                                                                                                                                                                                                                                              | $V_{CE(sat)}$ |                                   | 0.40 | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$                                                                                                                                                                                                                                                                                   | $V_{BE(sat)}$ | 0.80                              | 1.25 | Vdc |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                             |            |     |     |                 |
|-----------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|-----------------|
| Forward Current Transfer Ratio<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$                    | $h_{fe}$   | 60  | 300 |                 |
| Forward Current Transfer Ratio, Magnitude<br>$I_C = 20 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 100 \text{ MHz}$          | $ h_{fe} $ | 2.0 | 10  |                 |
| Small-Signal Common Emitter Input Impedance<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$       | $h_{je}$   | 1.5 | 9.0 | $k\Omega$       |
| Small-Signal Common Emitter Output Admittance<br>$I_C = 1.0 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$     | $h_{oe}$   |     | 50  | $\mu\text{hmo}$ |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                       | $C_{obo}$  |     | 8.0 | pF              |
| Noise Figure<br>$I_C = 100 \text{ } \mu\text{Adc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}, R_G = 1.0 \text{ k}\Omega$ | NF         |     | 8.0 | dB              |

**SWITCHING CHARACTERISTICS**

|                                                                               |                    |    |     |                |
|-------------------------------------------------------------------------------|--------------------|----|-----|----------------|
| Turn-On Time<br>(See Figure 4 of MIL-PRF-19500/421)                           | $t_{on}$           |    | 45  | $\eta\text{s}$ |
| Turn-Off Time<br>(See Figure 5 of MIL-PRF-19500/421)                          | $t_{off}$          |    | 300 | $\eta\text{s}$ |
| Pulse Response<br>(See Figure 6 of MIL-PRF-19500/421)                         | $t_{on} + t_{off}$ |    | 18  | $\eta\text{s}$ |
| Collector-Emitter Non-Latching Voltage<br>(See Figure 7 of MIL-PRF-19500/421) | $V_{CEO}$          | 40 |     | Vdc            |